SAWTOOTH FISH HATCHERY AND

EAST FORK SATELLITE

1987 Spring Chinook Salmon Brood Year Report
and
1988 Steelhead Brood Year Report

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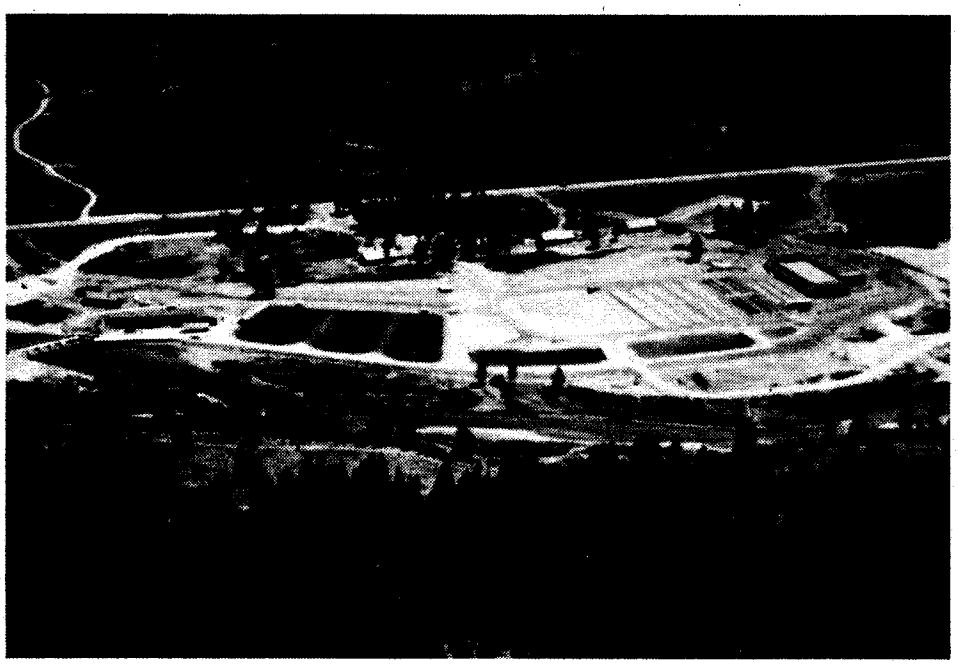

by
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SAWTOOTH FISH HATCHERY AND EAST FORK SATELLITE

1987 Brood Year Report

Spring Chinook Salmon

HATCHERY DESCRIPTION

Sawtooth Fish Hatchery is part of the Lower Snake River Compensation Plan, and has been in operation since 1985. Mitigation goals are for 2,400,000 spring chinook smolts and 4,500,000 steelhead eggs, which are to be reared at Hagerman National and Magic Valley hatcheries. A satellite station located on the East Fork of the Salmon River includes trapping, holding, and spawning facilities for salmon and steelhead.

Sawtooth Hatchery receives its water from the Salmon River and three production wells. The wells provide 7.8 cfs, and maintain a minimum temperature of 40° F in winter and up to 50° F during the latter part of the summer. The river provides up to 55 cfs of water, with temperature variations from 32° F to 68° F. Rearing water from the river enters an intake structure located one-half mile upstream from the hatchery building, and runs through a 54-inch pipe to a control box located in the hatchery building where final screening is accomplished. Water is then distributed to the indoor vats, outside raceways, or adult fish facility. Incubation water is provided by two production wells or river water. Back-up to the incubators is gravity flow river water through a check valve from the control box. Inside vats may utilize either well or river water, or both, with excess well water spilled back into the control box for use in the outside raceways.

Production facilities include: 100 stacks of FAL incubators containing 800 trays; 16 indoor rearing vats, each with 400 cubic feet of rearing space; 12 outside fry raceways, each with 750 cubic feet of rearing space; and 28 final rearing raceways, each with 2,700 cubic feet of rearing space. The lower sections of the final rearing raceways have serial re-use water from the top sections. The adult fish facility consists of a weir, fish trap, three adult holding ponds, each with 4,500 cubic feet of holding area, and a spawning area located at the upper end of the holding ponds.

1987 SPRING CHINOOK RETURNS

Returning adults to Sawtooth Hatchery in 1987 resulted from natural escapement, smolt releases in 1984 and 1985, and jacks returning from the 1986 release (Table 1). The Sawtooth fish weir and trap was put into operation on May 13, 1987 and was operated through September 8, 1987. The fish trap was checked daily and fish were transferred to the adult holding ponds or released

upstream of the weir to spawn naturallly. A total of 1,344 spring chinook salmon were trapped (Figure 1), which included 644 males and 700 females (Figure 2). We held 390 males and 448 females for spawning, while the remaining 254 males and 252 females were released upstream of the weir to spawn naturally. Ponded fish were injected with Erythromycin Phosphate at a rate of 5 mg for each pound of fish weight to help control Kidney Disease (BKD).

Table 1. Sawtooth Hatchery smolt release and adult returns,1987.

Brood year	Release year	Number released	Adult Returns Jacks	2-ocean	3-ocean	Total Returns[1]	%
1979	1981	None			291		inc.[2]
1980	1982	None	17	66	165	248	inc.
1981	1983	186,375	49	1,182	796	2,027	1.08
1982	1984	230,550	292	922	875	2,086	.91
1983	1985	420,060	51	452	1,318	1,821	.43
1984	1986	347,484	17	86	(1989)		inc.
1985	1987	1,185,061	80	(1989)	(1990)		inc.
1986	1987-88	1,705,500	(1989)	(1990)	(1991)		inc.
1987	1988-89	2,092,000	(1990)	(1991)	(1992)		inc.

[1]Includes an unknown number of natural fish.
[2]Incomplete or no smolts released.

The East Fork chinook adults returned from natural escapement, and jacks from smolts released in 1986 (Table 2).

Trapping of chinook salmon at the East Fork facility began on May 11, 1987 and continued through September 3, 1987. The trap was checked daily, and the fish were transferred to the holding ponds or released above the velocity barrier to spawn naturally. A total of 272 salmon were trapped (Figure 3), which included 159 males and 113 females (Figure 4).

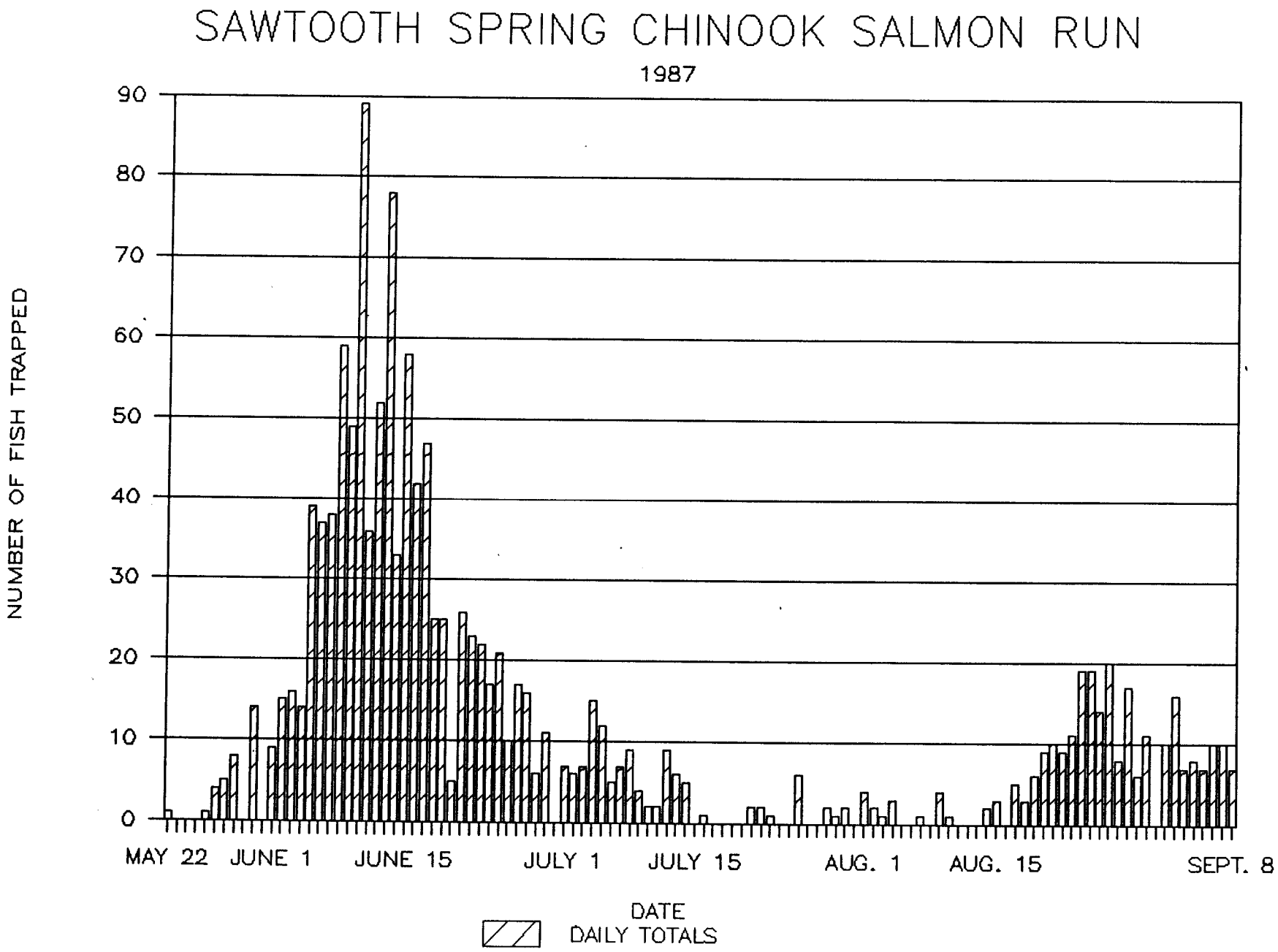

Figure 1. Run timing of adult spring chinook, Sawtooth 1987.

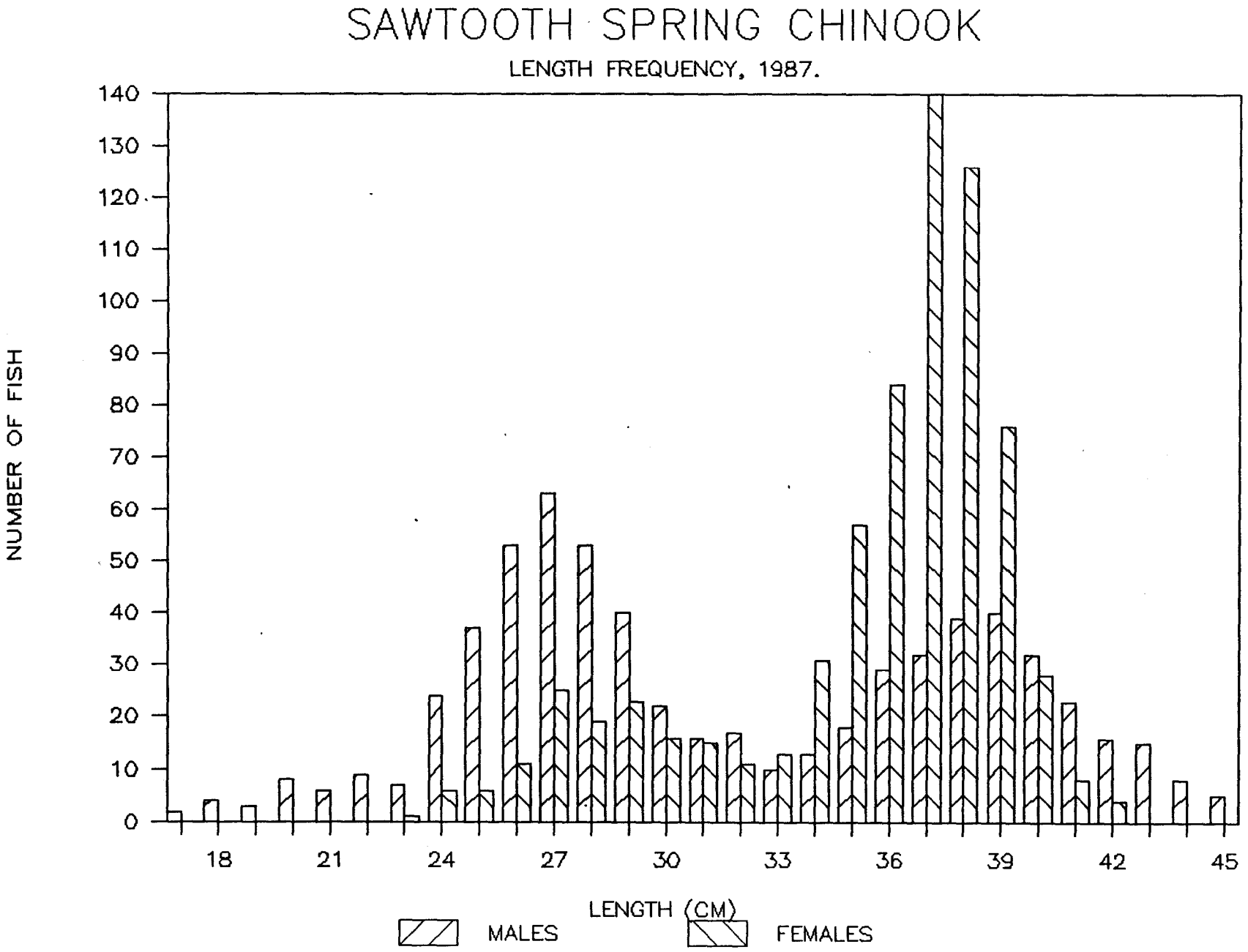

Figure 2. Adult spring chinook length frequency, Sawtooth 1987.

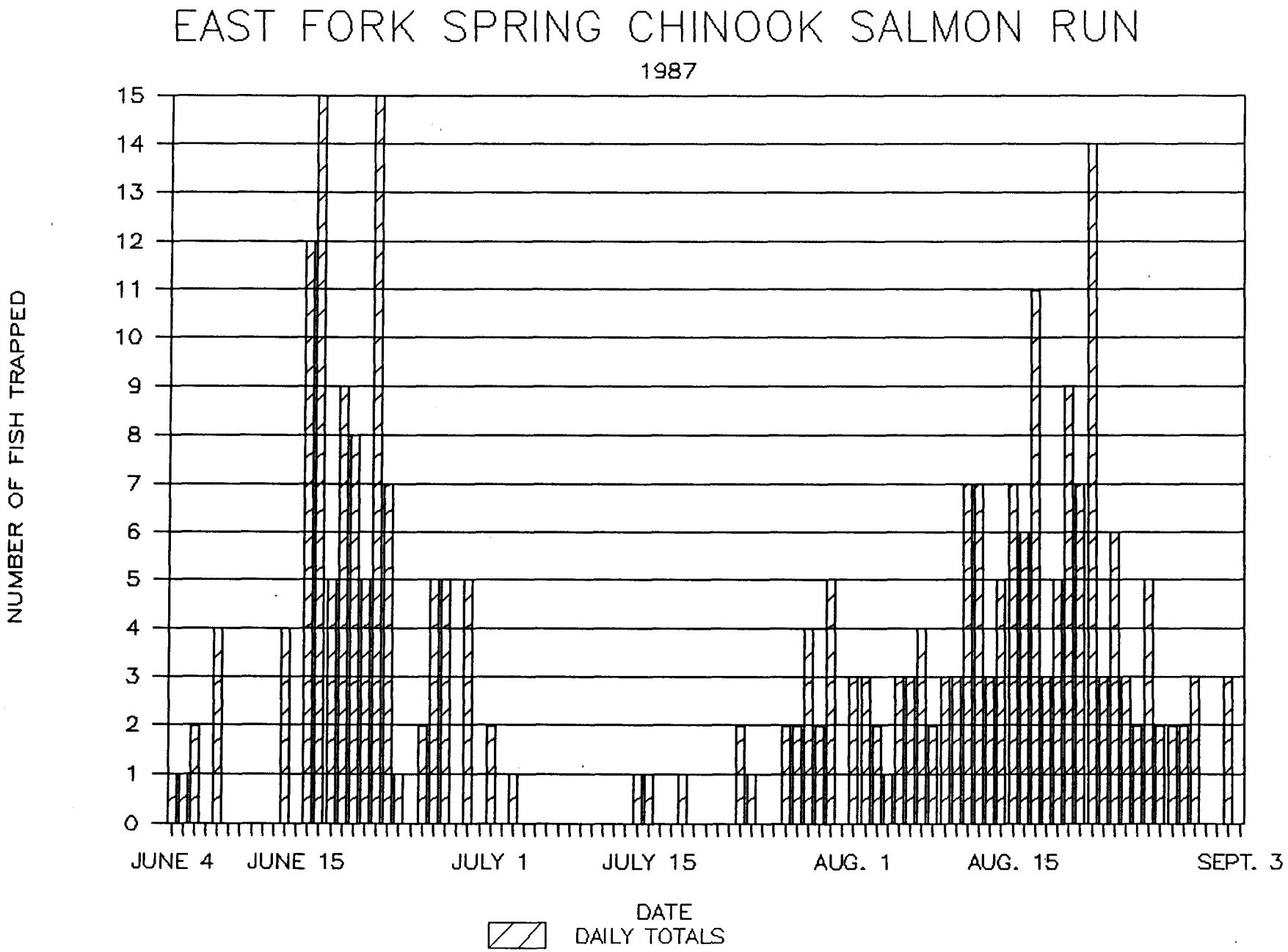

Figure 3. Run timing of adult spring chinook, East Fork 1987.

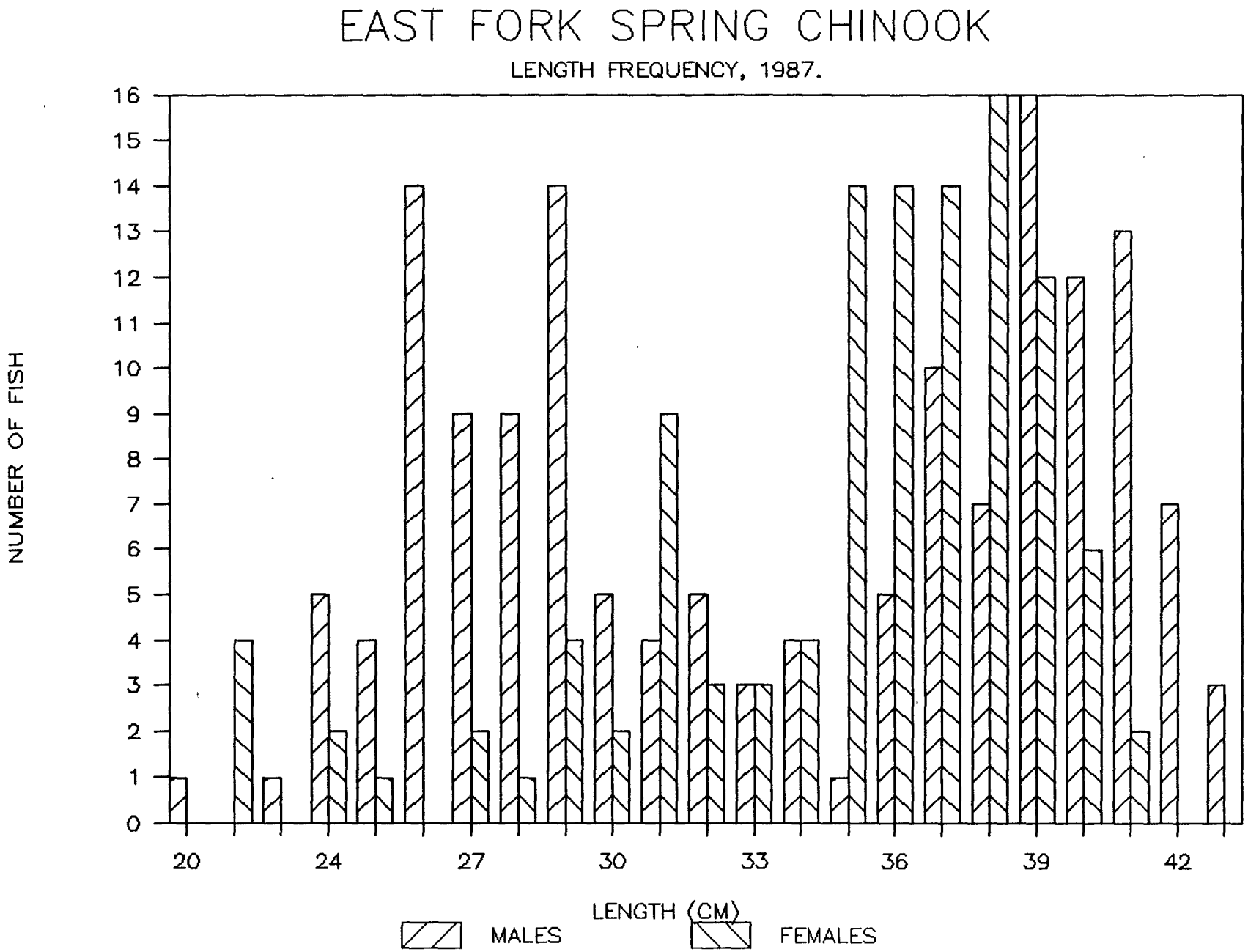

Figure 4. Adult spring chinook length frequency, East Fork 1987.

Table 2. East Fork chinook smolt releases and adult returns, 1987.

Brood year	Release year	Number released	Adult Returns Jacks	2-ocean	3-	Total returns	%
1979	1981	*[1]			69	69	inc.[2]
1980	1982	*		26	59	85	inc.
1981	1983	*	22	193	102	317	inc.
1982	1984	*	51	87	181	319	inc.
1983	1985	*	5	90	519	614	inc.
1984	1986	108,690	1	23	(1989)		inc.
1985	1987	195,100	6	(1989)	(1990)		inc.
1986	1988	249,200	(1989)	(1990)	(1991)		inc.
1987	1989	305,300	(1990)	(1991)	(1992)		inc.

[1]Includes remnant population of wild fish.
[2]lncomplete or no smolt released.

ADULT SPRING CHINOOK CODED WIRE TAG RECOVERIES

All adult spring chinook were examined for fin clips and tags. The recovery information was not received at the time of this report.

PRESPAWNING MORTALITY

Prespawning mortality included all females which died before spawning, and all males which died prior to the end of the second week of spawning. Sawtooth ponded 838 adult spring chinook and 35 were lost to prespawning mortality (4.2%). The East Fork ponded 174 adult spring chinook and 8 were lost to prespawning mortality (4.6%).

CHINOOK SPAWNING

Spawning operations began at Sawtooth on July 31, 1987 and continued on a biweekly basis through September 8, 1987. A total of 426 females were spawned for a total egg take of 2,721,399 green eggs, or a fecundity of 6,388 eggs per female.

East Fork spawning began on July 30, 1987 and continued biweekly through September 3, 1987. A total of 66 females were spawned for a total of 419,555 green eggs, or a fecundity of 6,357 eggs per female.

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Chinook eggs were taken by incision of the female with eggs entering a colander to drain off the ovarian fluid. Eggs from two females were then placed into a spawning bucket and fertilized by the sperm of two males. The eggs were rinsed in well water and water hardened in a 200 ppm Argentyne solution for one hour.

CARCASS DISPOSITION

Sawtooth and East Fork salmon carcasses were checked for coded wire tags, then placed in freezer boxes and stored in the freezer trailer until the end of the salmon season. They were then hauled to landfill and buried.

CHINOOK EGGS

After fertilization and water hardening, eggs were placed into incubators at 85 ounces per tray with the water flow set at 5 gpm. Incubation temperatures ranged between 40° and 50^0 F. To prevent fungus growth, eggs were treated with formalin five days a week at a concentration of 1,667 ppm. This treatment was discontinued after the eggs were eyed and picked.

Eggs eyed up at 550 temperature units, at which time they were shocked and picked. A Jensorter egg picker with counter was utilized to determine the total number of eggs on hand, eye-up percentage, and number of eggs remaining to hatch.

An eye-up percentage of 93.1% was obtained for Sawtooth, and 82.5% for the East Fork eggs. Eyed eggs were measured back into the incubators at 85 ounces per tray, and began to hatch at 900 temperature units.

An additional 1,093,272 green eggs were received from Pahsimeroi Hatchery, and a 79.5% eye-up was achieved leaving 868,624 eyed eggs. These eyed eggs were then planted directly into the gravel during October, 1987 to various Clearwater and Salmon River tributaries.

CHINOOK FRY

The swim-up fry were moved to the indoor rearing vats at approximately 1,675 temperature units, or when the fry began to button-up. Fry were placed into the vats at 200,000 fish per vat, in 200 cubic feet of rearing space. Initial feeding was begun with OMP IV starter mash and OMP IV 1/32" for one week, then the fry were fed entirely 1/32" until they reached 400 fish per pound. The fry were given the entire 400 cubic feet of rearing space after three to four weeks.

These chinook fry grew at a rate of .261 inches (6.6mm) per month. When they reached 400 fish per pound, the 1/32" OMP IV was mixed with 3/64" OMP IV for seven days, then the fry were fed straight 3/64" until the fry reached 200 fish per pound.

Two of the early rearing vats were used for an experimental baffle study which proved to be very beneficial to vat cleaning, fish dispersion, and feed utilization.

All OMP IV feed through 3/64" was enhanced with ten times the normal pantothenic acid to help prevent "spring thing" mortality.

We planted 48,000 Sawtooth fry in May of 1988 in both Pole Creek and Smiley Creek for a Fish and Game research project conducted by Russ Kiefer.

CHINOOK FINGERLINGS

The 1987 brood year chinook were moved from the early rearing vats to the outside raceways starting the first week in April, 1988, with the last of the fish moved out the end of May. The fingerlings averaged 250 fish per pound, and 200,000 were placed in 2,700 cubic feet of rearing space, at 1.5 cfs of water flow per raceway. When they reached a density index of .3, they were given 5,400 cubic feet of rearing space, and water flows were increased to 2.5 cfs per raceway. Fingerlings were switched to OMP IV 1/16" at 200 fish per pound, then to 3/32" at 100 fish per pound. OMP IV 1/8" pellets were fed as the fish reached 50 fish per pound until they were released.

CHINOOK SMOLTS

A fall release of 990,400 smolts was made on October 12, 1988, which included 172,300 RV clipped fish, 150,400 CWT fish, and 2,697 P.I.T. tagged fish. These fish averaged 20.4 fish per pound or 46,452 pounds of fish. The increased fall release numbers were deemed necessary due to low water conditions going into the winter.

In March 1989, chinook smolts were evaluated for condition and disease by the Idaho Fish and Game pathologist. The smolts were found to be in generally good condition, with the exception of a raceway section of CWT/FB fish, which were found to be heavily infected with Bacterial Kidney Disease (BKD). BKD incidence was found in all raceways at a 24% incidence level which was higher than previous years, probably attributed to low water and high water temperatures during the last two years of drought.

Whirling Disease was also found in the pre-release smolts, but at a low incidence and causing no fish mortality.

The following results were found using the Goede and Houghton (1985) autopsy based fish health/condition assessment system:

Sawtooth stock Summary of Normals

Eyes:	90%
Gills:	100%
Pseudobranchs:	100%
Thymus:	98%
Mesentary Fat:	87% greater than 50% coverage
Spleen:	100%
Kidney:	97%
Liver:	78%
Bile:	100% full bladder

Remarks: East Fork stock were generally the same readings.

On March 15 and 21, 1989, the screens and boards were pulled on the Sawtooth stock for spring released fish, with a total of 1,101,600 smolts released into the Salmon River. These smolts averaged 22 fish per pound, or 50,155 pounds of fish. An additional 198,200 Sawtooth smolts were planted in the Yankee Fork on March 21, 1989. They averaged 24 fish per pound, or 8,258 pounds of fish. The East Fork smolts, which totaled 305,300, were planted in the East Fork of the Salmon River on March 20, 1989. They averaged 19.7 fish per pound, or 15,490 pounds of fish.

Total survival from green eggs to release was: Sawtooth stock, 86%; East Fork stock, 73%; and Pahsimeroi stock, 79.5% (Table 3).

Table 3. Survival from green eggs to release.

Green eggs	Eyed eggs	%	Swim-up	%	Released	%
Sawtooth						
2,721,399	2,533,640	93.1	2,487,500	92.4	2,338,244	86.0
East Fork						
419,555	346,134	82.5	341,281	81.3	305,300	73.0
Pahsimeroi						
1,093,272	868,624	79.5				

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PRODUCTION COSTS

The cost of producing chinook eggs, fry, and smolts is summarized in Table 4. An overall conversion of 1.77 was attained on both Sawtooth and East Fork spring chinook during the rearing period (Table 4).

Table 4. Production costs.

Lbs. of fish produced	Lbs. of feed fed	Feed cost	Conversion	Cost per lb produced
120,527	218,900	$110,950	1.77	$.92

Personnel costs	$303.800
Operating costs	446,182
Capital outlay	15.200
Program total[1]	$765,222

[1]Costs estimated for entire 18-month rearing cycle.

1988 STEELHEAD BROOD YEAR REPORT

STEELHEAD ADULT RETURNS

The 1988 Sawtooth Steelhead adult returns were from 784,100 smolts released in 1985, and 699,700 smolts released in 1986. These fish were reared and stocked by Hagerman National Hatchery (Table 5). Some returns were also from natural spawning fish.

The Sawtooth fish trap was installed and put into operation on March 3, 1988, and was operated through_ May 3. A total of 990 adult Steelhead were trapped during this period (Figures 5 and 6), which included 546 males and 444 females.

The 1988 East Fork adult steelhead returns were from 393,500 smolts released in 1984, 270,200 in 1985, and 525,300 in 1986. These fish were reared and stocked from Hagerman National Hatchery. Some returns were also from natural spawning fish.

Table 5. Steelhead smolt release to bring back 1988 adults.

Date Released	Hatchery Rearing	Number	Marks	Stock
SAWTOOTH				
1985	HNFH	40,475	102630LV	A
1985	HNFH	35,125	RD-Y-1	A
1985	HNFH	708,496	NONE	A
1986	HNFH	9,450	102801LV	A
1986	HNFH	39,125	102844LV	A
1986	HNFH	52,300	LD-T-2	A
1986	HNFH	598,840	NONE	A
TOTAL		1,483,811		
EAST FORK				
1984	HNFH	393,452	NONE	B
1985	HNFH	39,375	102631LV	B
1985	HNFH	35,225	102636LV	B
1985	HNFH	17,425	102555LV	B
1985	HNFH	16,950	102803LV	B
1985	HNFH	8,100	102802LV	B
1985	HNFH	25,525	102854LV	B
1985	HNFH	31,775	RD-Y-3	B
1986	HNFH	95,833	NONE	B
1986	HNFH	25,325	102820LV	B
1986	HNFH	51,325	LD-T-4	B
1986	HNFH	448,666	NONE	B
TOTAL		1,125,976		

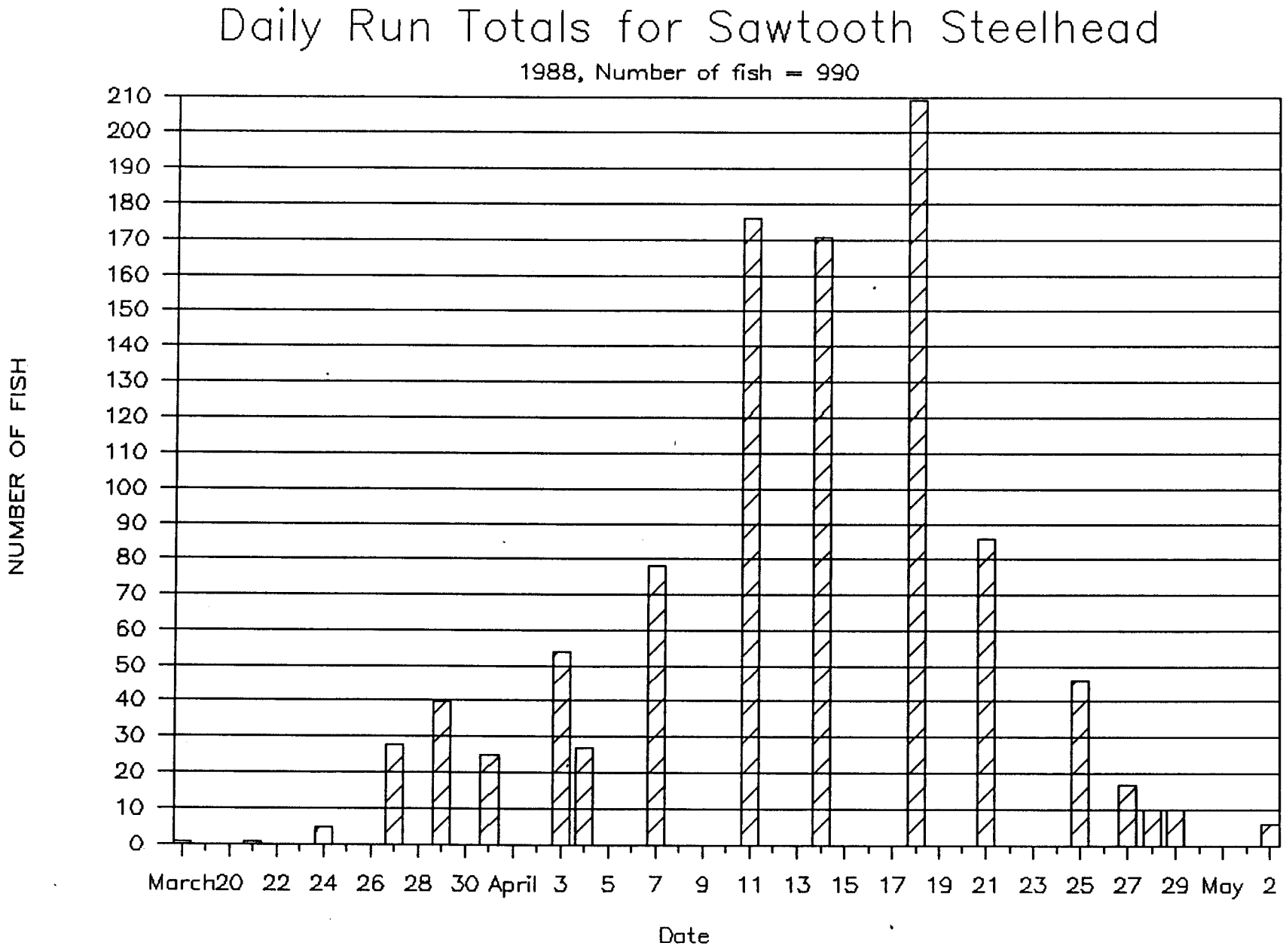

Figure 5. Adult steelhead run timing graph, Sawtooth Hatchery.

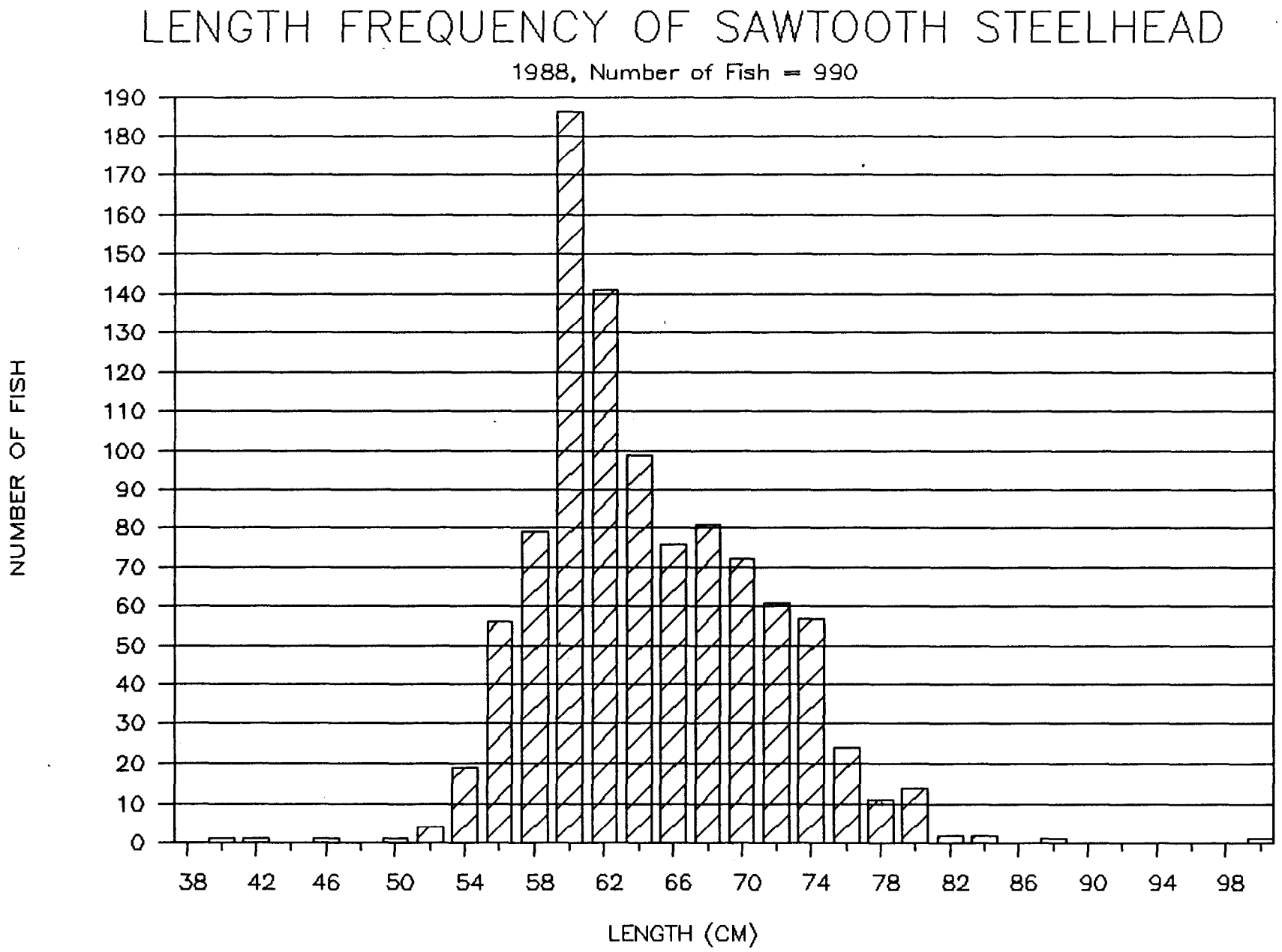

Figure 6. Adult steelhead length frequency graph, Sawtooth Hatchery.

The East Fork trap and velocity barrier was put into operation on March 15, 1988, and operated through May 2. A total of 210 (120 females and 90 males) adult Steelhead were trapped during that period (Figures 7 and 8).

ADULT STEELHEAD CODED WIRE TAG RECOVERY

Adult steelhead at both Sawtooth and East Fork were examined for clips, marks, or tags before release or before being spawned. Recovery data on coded wire tagged fish was not available at this time.

STEELHEAD SPAWNING

Spawning operations began at Sawtooth on March 30, 1988, and continued through April 22. A total of 308 females were spawned, yielding 1,561,300 eggs, or 5,069 eggs per female. There were eight steelhead spawning days at Sawtooth over that period.

The East Fork spawning operation began on April 7, 1988, and went through April 28, with seven spawning days represented in that period. Seventy-nine females were spawned, yielding 448,034 eggs, or 5,571 eggs per female.

Eggs were stripped from the females into colanders, draining off ovarian fluid, and then placed into spawning buckets. The eggs were then fertilized on a one female to one male basis and added to another pairs' eggs to form two-pool lots. The eggs were allowed to sit for one to three minutes, and then were rinsed with well water and water hardened in a 200 ppm solution of Argentyne before put into incubators.

DISEASE SAMPLINGS

All Sawtooth Hatchery "A" eggs being shipped to Hagerman National required virus disease certification. To accomplish this, each female's ovarian fluid was sampled, along with a small sample of kidney and spleen from each male. The pair of fish were numbered and the eggs were identified until disease certification was given. These same type of samples were also taken at the East Fork trap. Seven two-fish pools of eggs came back virus positive (five were from Sawtooth, two from East Fork).

Scott Foott took disease samples at Sawtooth for our department's disease lab. Scott sampled 64 fish representing 32 two-fish pool groups. He checked ovarian fluid for virus and BKD, kidney and spleen samples from the males for virus, and blood and samples on both sexes for EIBS. The hatchery crew took the same samples at the East Fork trap. All fish were negative for viruses and EIBS, with ten pools at East Fork positive for BKD. Sawtooth was negative for

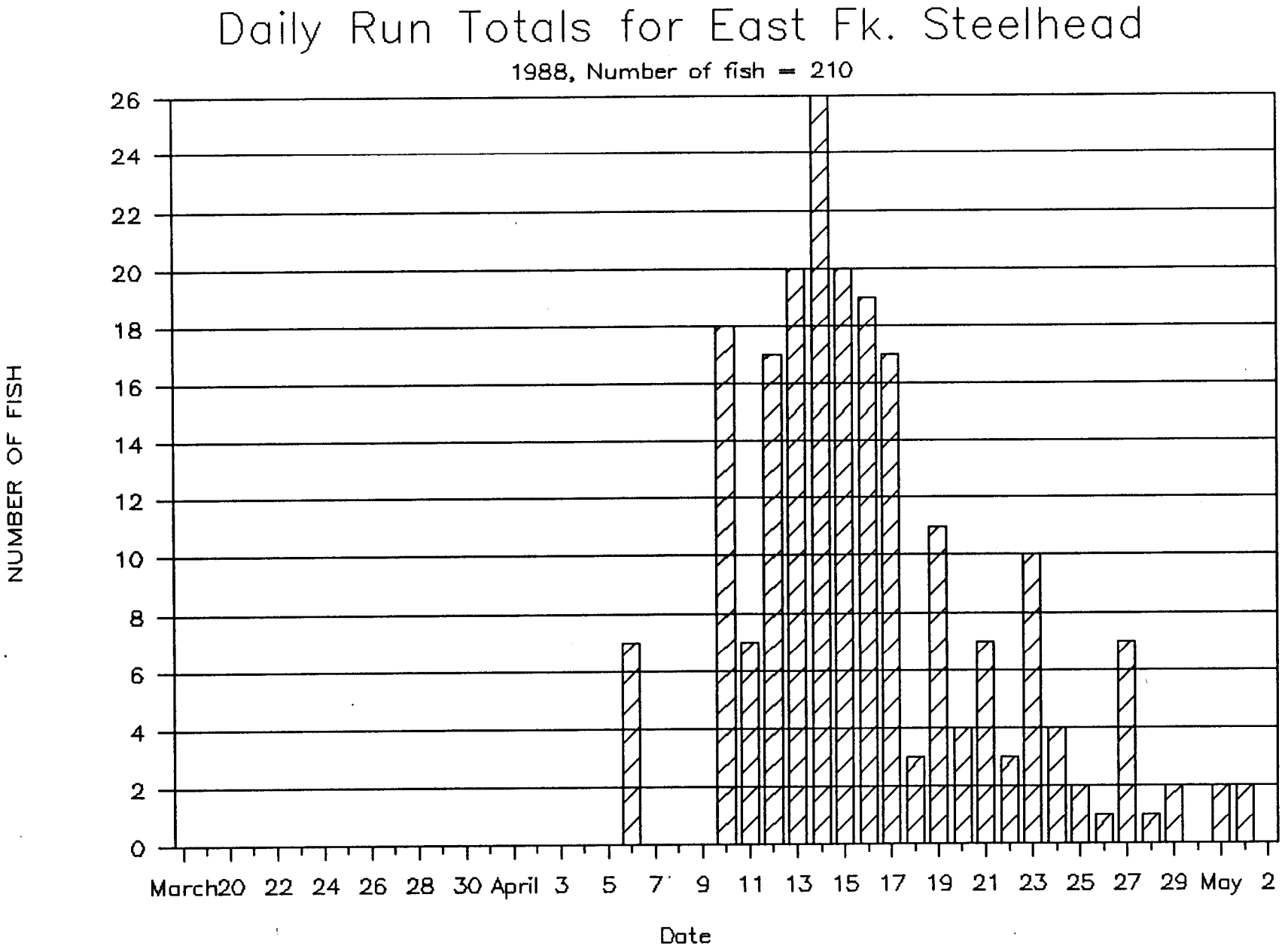

Figure 7. Adult steelhead run timing graph, East Fork Trap.

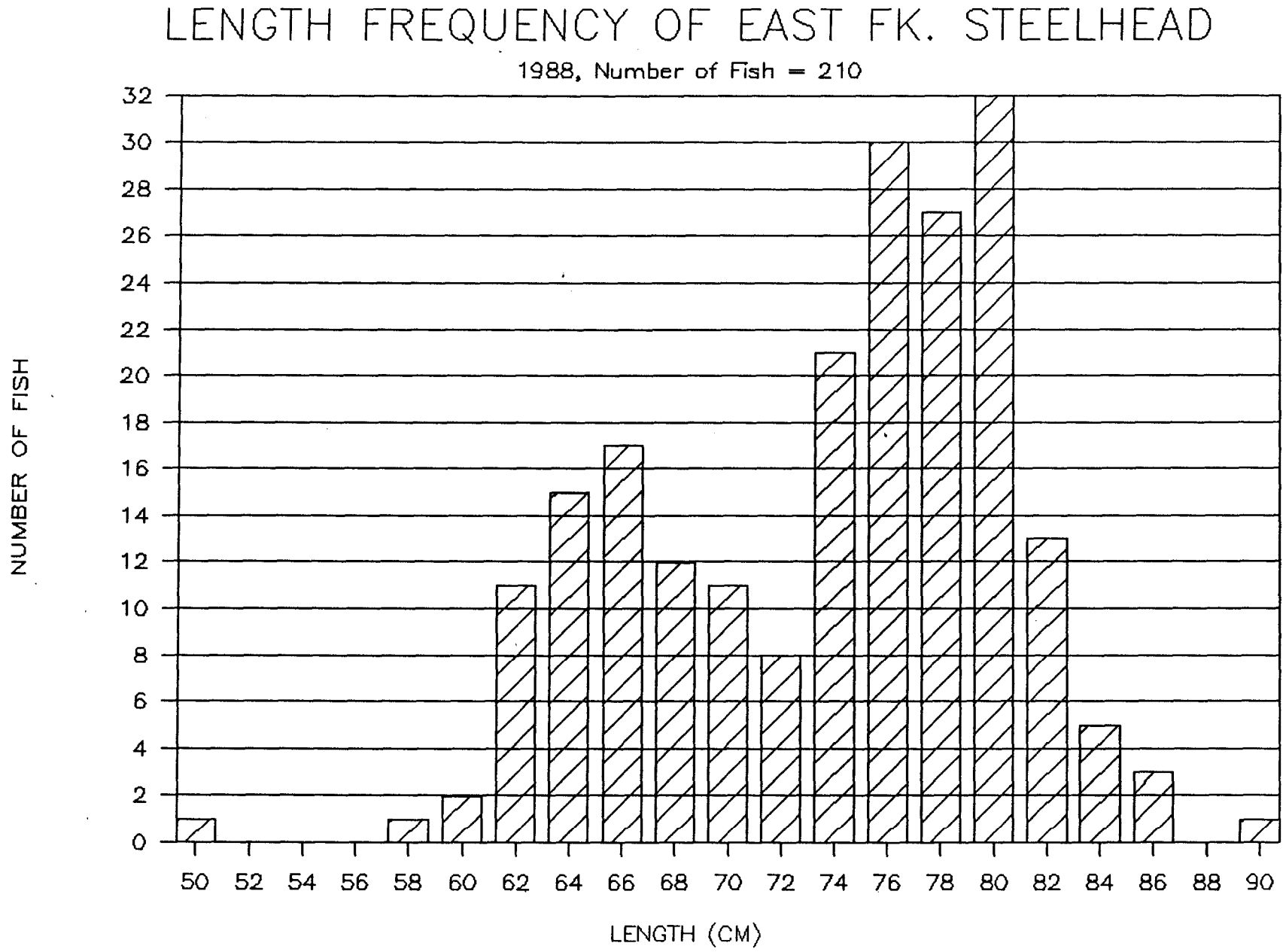

Figure 8. Adult steelhead length frequency graph, East Fork Trap.

BKD.. Scott also took 30 core-samples in five-fish pools at Sawtooth for whirling disease. Six out of six pools were presumed positive. The hatchery crew took 25 core-samples in 5 fish pools at the East Fork trap, and the 5 pools were all negative in whirling disease.

FISH DISPOSITION

Six hundred and twenty-five kelts were given to the public at Sawtooth, while 365 fish were released to spawn naturally. At the East Fork, 138 kelts were given away, and 72 fish were released (Table 6).

STEELHEAD EGGS

After water hardening, eggs were placed into Heath incubators at 70 ounces per tray (16,000 eggs), or at 35 ounces per tray (8,000 eggs) if those eggs were destined as fry plants. After 72 hours, all eggs were treated with formalin at a rate of 1,667 ppm, five days a week in a 15-minute drip. The eggs eyed-up at 350 temperature units, at which time they were shocked and then machine picked. An additional follow-up of hand picking readied the eggs for shipment. After eye-up and picking, 1,119,713 "A" eggs were shipped to Hagerman National, and 357,506 "B" eggs were shipped to Magic Valley Hatchery. The remaining eggs were incubated at Sawtooth, and yielded 261,400 fry that were used for out-plants.

At Sawtooth a total of 1,561,300 green "A" eggs were taken, yielding 1,366,382 eyed eggs, or 87.1% eye-up. The East Fork facility took 448,000 green eggs during the spawning season, resulting in 357,506 eyed eggs, or 81.2% eye-up.

The Sawtooth Hatchery also received 3,822,687 green eggs from Pahsimeroi Hatchery. These eggs were incubated to eye-up, picked, yielding 3,084,404 good eggs with an eye-up of 78.1%, and then 2,052,568 eggs were shipped to Magic Valley. The remaining 929,754 eyed eggs were incubated to swim-up, and 920,600 fry were stocked in the upper Salmon River drainage.

STOCKING

Hagerman National and Magic Valley hatcheries stocked 1988 brood year smolts at Sawtooth Hatchery and at the East Fork trap from April 7 to April 19. Sawtooth received 1,493,900 "A's", which averaged 4.63 fish per pound, or 322,400 pounds, and the East Fork facility received 789,900 "B's" at 4.75 fish per pound, or 166,200 pounds. A total of 1,182,000 fry were also released in the upper Salmon River and seven of its tributaries.

Table 6. Summary of steelhead trapped, spawned, and released and kelt disposition at sawtooth and East Fork Facilities, 1988.

STEELHEAD: _ SAWTOOTH HATCHERY

Fish trapped: 990

Males trapped : 546
Females trapped: 444
Total trapped : 990

Fish disposition:

Females: 308 Spawned, killed & given to public
136 Released upstream to spawn naturally
444 Total

Males: 317 Spawned, killed & given to public
229 Released upstream to spawn naturally
546 Total

Totals: 625 Kelts were given to public
365 Fish were released

STEELHEAD: _ EAST FORK

Fish trapped: 210

Males trapped : 90
Females trapped: 122
Total trapped : 210

Fish disposition:

Females: 79 Spawned, killed & given to public
41 Released upstream to spawn naturally
120 Total

Males: 59 Spawned, killed & given to public
31 Released upstream to spawn naturally
90 Total

Totals: 138 Kelts were given to public
72 Fish were released

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A P P E N D I C E S

Appendix 1. Length frequency distribution of Sawtooth chinook, 1987.

	Fish Trapped	Males	Females	Length (in)	Length (in)
	2	2	0	17	43
	4	4	0	18	46
	3	3	0	19	48
	8	8	0	20	51
	6	6	0	21	53
	9	9	0	22	56
	8	7	1	23	58
	30	24	6	24	61
	43	37	6	25	64
	64	53	11	26	66
	88	63	25	27	69
	72	53	19	28	71
	63	40	23	29	74
	38	22	16	30	76
	31	16	15	31	79
	28	17	11	32	81
	23	10	13	33	84
	44	13	31	34	86
	75	18	57	35	89
	113	29	84	36	91
	172	32	140	37	94
	165	39	126	38	97
	116	40	76	39	99
	60	32	28	40	102
	31	23	8	41	104
	20	16	4	42	107
	15	15	0	43	109
	8	8	0	44	112
	5	5	0	45	114
Total	1344	644	700		

APPENDX

Appendix 2. Length frequency distribution of East Fork chinook, 1987.

	Fish trapped	Males	Females	Length (in)	Length
	1	1	0	20	51
	4	0	4	21	53
	1	1	0	23	58
	7	5	2	24	61
	5	4	1	25	64
	14	14	0	26	66
	11	9	2	27	69
	10	9	1	28	71
	18	14	4	29	74
	7	5	2	30	76
	13	4	9	31	79
	8	.5	3	32	81
	6	3	3	33	84
	8	4	4	34	86
	15	1	14	35	89
	19	5	14	36	91
	24	10	14	37	94
	23	7	16	38	97
	28	16	12	39	99
	18	12	6	40	102
	15	13	2	41	104
	7	7	0	42	107
	3	3	0	43	109
	5	5	0	44	112
	2	2	0	45	114
Total	272	159	113		

Appendix 3. Length Frequency distribution of Sawtooth steelhead, 1988.

Length (cm)	Hatchery males	Wild males	Hatchery females	Wild females	Tota
38	1				1
40	1				1
42					
44	1				1
46					
48					
50	1				1
52	4				4
54	13	1	5		19
56	30	4	17	5	56
58	49	6	21	3	79
60	133	5	40	8	186
62	94	5	33	9	141
64	54	9	31	5	99
66	36	11	27	2	76
68	21	10	46	4	81
70	10	5	51	6	72
72	15	2	38	6	61
74	8	2	41	6	57
76	8		11	5	24
78	1	1	7	2	11
80	2		8	4	14
82	2				2
84		1	1		2
86					
88				1	1
90					
92					
94					
96					
98					
100				1	1
Total	484	62	377	67	990

Appendix 4. Length frequency distribution of East Fork steelhead, 1988.

Length (cm)	Hatchery males	Wild males	Hatchery females	Wild females	Total
50	1				1
52					0
54					0
56					0
58			1		1
60	1	1			2
62	8	2	1		11
64	14			1	15
66	16		1		17
68	9	2	1		12
70	6	2	1	2	11
72	1		6	1	8
74	2		18	1	21
76	2	2	22	4	30
78	5		22		27
80	7	1	24		32
82	4		9		13
84	2		3		5
86	2			1	3
88					0
90			1		1
Total	80	10	110	10	210

Submitted by:

Thomas L. Rogers
Fish Hatchery Superintendent III

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

Steven M. Huffaker, Chief
Bureau of Fisheries

Bill Hutchinson
Hatcheries Manager